PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 26981AWO-7A ST/stu	**FOR FURTHER ACTION**	See Form PCT/IPEA/416
International application No. PCT/CH2004/000461	International filing date *(day/month/year)* 21.07.2004	Priority date *(day/month/year)* 22.07.2003
International Patent Classification (IPC) or national classification and IPC C02F1/00, C02F1/44, B01D61/02		
Applicant DCT DOUBLE-CONE TECHNOLOGY AG et al.		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 7 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☒ *sent to the applicant and to the International Bureau)* a total of 1 sheets, as follows:
      ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

☒	Box No. I	Basis of the opinion
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☒	Box No. VIII	Certain observations on the international application

Date of submission of the demand	Date of completion of this report
22.02.2005	01.12.2005
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Kurtulan, M Telephone No. +49 89 2399-8076

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/CH2004/000461

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

   ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
   - ☐ international search (under Rules 12.3 and 23.1(b))
   - ☐ publication of the international application (under Rule 12.4)
   - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages

1-15	as originally filed

Claims, Numbers

2-11	as originally filed
1	received on 24.02.2005 with letter of 22.02.2005

Drawings, Sheets

1/6-6/6	as originally filed

☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

* *If item 4 applies, some or all of these sheets may be marked "superseded."*

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/CH2004/000461

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-11
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-11
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-11
	No:	Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Re Item I

Basis of the report

This opinion is based on the amendments filed with the letter of 22.02.2005. Hence, claim 1 is amended, claims 2-11 are examined as originally filed.

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Reference is made to the following documents:
   D1: EP-A-1 161 981 (TORAY INDUSTRIES) 12 December 2001 (2001-12-12)
   D2: EP-A-0 055 981 (MESPLE JOSE L R) 14 July 1982 (1982-07-14)
   D3: WO 00/75510 A (UNIV TEXAS) 14 December 2000 (2000-12-14)
   D4: WO 01/16493 A (DCT DOUBLE CONE TECHNOLOGY AG ; STARK JOHN HERMAN (CH); WAGENBACH HANS) 8 March 2001 (2001-03-08)
   D5: EP-A-1 243 748 (DCT DOUBLE CONE TECHNOLOGY AG) 25 September 2002 (2002-09-25)

2. The document D1 is regarded as being the closest prior art to the subject-matter of claim 1 and discloses (column 6, lines 5-51; figures 1-2; column 7, line 45-column 8, line 32; column 9, lines 43-46; column 11, lines 27-42; claims 15, 16, 19, 20, 30, 31):

   A desalination apparatus for the desalination of brackish water and sea water; a multistage reverse osmosis separation which comprises reverse osmosis membrane module units arranged at multistage with a booster pump provided in the concentrate flow channel between reverse osmosis membrane module units, wherein the reverse osmosis membrane module units are arranged in multistage such that the concentrate of one stage is supplied to the next stage and the low-concentration outflows from the stages are collected. A pressure pump is in a feed water channel at the upstream side of the first stage. The pressure and booster pumps pressurize the concentrate. The concentrate from the final-stage reverse osmosis membrane module unit has pressure energy that is recovered by returning the energy directly to the energy recover turbine connected directly to the pressure pump at the first-stage

module unit that needs the largest energy.

2.1 The subject-matter of claim 1 therefore differs from this known desalination apparatus in that the water treatment system comprises:

- a well pump arrangement for drawing contaminated/saline water from a well
- the well pump arrangement further comprises at least one double-cone device having an inlet where matter is sucked during operation wherein the brine solution is reusable as feed for the double-cone device

The subject-matter of claim 1 is therefore new (Article 33(2) PCT).

2.2 The problem to be solved by the present invention may be regarded as avoiding the problem of disposal of brine, while at the same time recycling the brine energy.

The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

D5 (paragraphs 1, 3, 12, 14, 17; figures 1, 5) discloses a similar double-cone well pump installation comprising a separator unit. However, the combined teachings of D1 and D5 do not provide the recirculation of the brine into the well pump, ie. the obtained method does not keep the brine in a closed loop.

D4 (page 6, lines 18-25; page 7, line 19-page 8, line 2; page 9, lines 1-21; page 10, lines 14-22; page 11, lines 29-35; claims 7-13; figures 4-8) discloses a similar reverse osmosis desalination apparatus using double cone technology, but still the combined disclosures of D4 and D1 do not solve the problem of rejecting the brine into the environment.

2.3 Considering D2 as the closest prior art (page 7, lines 3-8; page 10, lines 6-13; figure 4; page 13, line 24-page 14, line 19; page 15, line 28-page 16, line 31; page 18, lines 9-24; claims 1,2) and combining the disclosure of D2 with the teachings of D4 or D5 does not solve the problem of brine disposal into the environment, by the same

arguments presented above.

In conclusion, no obvious combination of D1 or D2 with any one of the documents D4 or D5 teaches to use a double-cone as the feeder pump in a well pump arrangement with the used brine driving the double-cone. More specifically, it is not obvious to conduct the brine from the separating unit to the well pump, as it is defined by claim 1.

2.4 Claims 2-7 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

2.5 Following the same argumentation as in items 2 and 2.1 of the present communication, the document D1 (see citations above) is regarded as being the closest prior art to the subject-matter of claim 8.

The subject-matter of claim 8 differs from this known desalination method in that

- the water treatment system comprises a well pump arrangement for drawing saline water from a well
- utilizing the brine as a feed to run the well pump arrangement
- stopping the brine flow through the well pump when the concentration of the contamination in the brine exceeds a predetermined limit, so that brine exits the well pump into the well in order to avoid disposal of brine solution into the environment.

The subject-matter of claim 8 is therefore new (Article 33(2) PCT).

2.6 The problem to be solved by the present invention may therefore be regarded as integrating the desalination unit with a well pump arrangement to treat water from deep wells without having to dispose brine solution into the environment.

The solution to this problem proposed in claim 8 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the same reasons as in items 2.2 and 2.3 of the present communication.

Furthermore, the teachings of D3 (page 3, lines 8-29; claim 1; figure 3) do not solve the above mentioned problem either.

2.7 Claims 9-11 are dependent on claim 8 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

Re Item VIII
Certain observations on the international application

Claims 1 and 8 do not meet the requirements of Article 6 PCT in that the following statements:

- "so that brine solution is capable to poor out .... and disposal of brine solution and into the environment is avoided" in claim 1
- "so that brine exits the well pump into the well in order to avoid disposal of brine solution into the environment" in claim 8

attempt to define the subject-matter in terms of the result to be achieved, which merely amounts to a statement of the underlying problem. These statements are not considered to be limiting as such since they do not indicate any technical features necessary for achieving this result.

CLAIMS

1. A water treatment system (100) comprising:

a. a well pump arrangement (102) for drawing contaminated, more specifically saline, water from a well;

the well pump arrangement comprising at least one double-cone device, the double-cone device having an inlet where matter is sucked in during operation;

b. a purification unit (104) for separating the contaminated water into purified water and brine solution, the purification unit further comprising:

i. an intermediate reservoir (110) for storing the contaminated water;

ii. a pumping arrangement (112) to pressurize the contaminated water obtained from the intermediate reservoir; and

iii. a separating unit (114) to separate the pressurized contaminated water into purified water and brine solution;

c. a brine line (106) for carrying the brine solution from the separating unit to the well pump arrangement;

so that brine solution is capable to pour out of the inlet of the double-cone device and to sink down in the well and disposal of brine solution and into the environment is avoided, and that the brine solution is reusable as feed for the double-cone device for reusing the energy stored in it.

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